

WHAT IS CLAIMED IS:

- 1           1. A method, comprising:  
2           storing target data from at least one target address of a target storage of a system  
3           into a cache for an engine of a network adapter of the system wherein the network  
4           adapter is coupled to a network;  
5           receiving from an initiator, a packet containing a read command which addresses  
6           target data having a target address within said target storage;  
7           comparing the target address of the read command to a target address of the target  
8           data in the cache for the network adapter engine; and  
9           processing said read command using said network adapter engine if target data  
10          stored in the cache was obtained from a target address which corresponds to the read  
11          command target address, said processing including sending target data stored in the cache  
12          to the initiator.
- 1           2. The method of claim 1 further comprising forwarding the read command to a  
2           target controller coupled to the target storage to be processed by the target controller if  
3           the target data stored in the cache was obtained from a target address which does not  
4           correspond to the read command target address.
- 1           3. The method of claim 1 wherein said read command is a Small Computer  
2           System Interface command packaged in an Internet Small Computer System Interface  
3           package.
- 1           4. The method of claim 3 wherein the Internet Small Computer System Interface  
2           package is encapsulated in Internet Protocol and Transmission Control Protocol package  
3           layers which are encapsulated in an Ethernet packet.
- 1           5. The method of claim 4 further comprising forwarding the read command to a  
2           target controller coupled to the target storage, for processing by the target controller in  
3           accordance with an Internet Small Computer System Interface layer if the target data

4 stored in the cache was obtained from a target address which does not correspond to the  
5 read command target address.

1 6. The method of claim 5 wherein said processing said read command using said  
2 network adapter engine is in accordance with an Internet Small Computer System  
3 Interface layer and includes translating said target data to an Internet Small Computer  
4 System Interface data sequence and sending the sequence to the initiator over the  
5 network.

1 7. The method of claim 6 further comprising storing in said cache the target  
2 addresses within said target storage from which the target data stored in said cache was  
3 obtained.

1 8. The method of claim 6 wherein said target controller includes a state machine  
2 having Internet Small Computer System Interface session state variables, and said  
3 network adapter includes a state machine having at least one Internet Small Computer  
4 System Interface session state variable, said method further comprising synchronizing a  
5 value of said network adapter state variable to a value of said target controller state  
6 variable in connection with said network adapter translating said target data to be sent to  
7 said initiator into an Internet Small Computer System Interface data sequence.

1 9. The method of claim 8 further comprising:  
2 receiving from said initiator, a second packet containing a second read command  
3 which addresses target data having a target address within said target storage;  
4 comparing the target address of the second read command to a target address of  
5 the target data in the cache for the network adapter engine; and  
6 processing said read command using said target controller if the target data stored  
7 in the cache was obtained from target addresses which do not correspond to the read  
8 command target address, said processing including sending target data to the initiator.

1 10. The method of claim 9 further comprising synchronizing a value of said  
2 target controller state variable to a value of said network adapter state variable in

3 connection with said target controller processing said second read command.

1 11. An article comprising a storage medium, the storage medium comprising  
2 machine readable instructions stored thereon to:

3 store target data from at least one target address of a target storage of a system  
4 into a cache for an engine of a network adapter of the system;

5 receive over the network from an initiator, a packet containing a read command  
6 which addresses target data having a target address within said target storage;

7 compare the target address of the read command to a target address of the target  
8 data in the cache for the network adapter engine; and

9 process said read command using said network adapter engine if target data stored  
10 in the cache was obtained from a target address which corresponds to the read command  
11 target address, said processing including sending target data stored in the cache to the  
12 initiator.

1 12. The article of claim 11 wherein the storage medium further comprises  
2 machine readable instructions stored thereon to forward the read command to a target  
3 controller coupled to the target storage to be processed by the target controller if the  
4 target data stored in the cache was obtained from a target address which does not  
5 correspond to the read command target address.

1 13. The article of claim 11 wherein said read command is a Small Computer  
2 System Interface command packaged in an Internet Small Computer System Interface  
3 package.

1 14. The article of claim 13 wherein the Internet Small Computer System Interface  
2 package is encapsulated in Internet Protocol and Transmission Control Protocol package  
3 layers which are encapsulated in an Ethernet packet.

1 15. The article of claim 14 wherein the storage medium further comprises  
2 machine readable instructions stored thereon to forward the read command to a target  
3 controller coupled to the target storage, for processing by the target controller in

4 accordance with an Internet Small Computer System Interface layer if the target data  
5 stored in the cache was obtained from a target address which does not correspond to the  
6 read command target address.

1 16. The article of claim 15 wherein the machine readable instructions to process  
2 said read command using said network adapter engine include machine readable  
3 instructions stored on the storage medium to process said read command in accordance  
4 with an Internet Small Computer System Interface layer including translating said target  
5 data to an Internet Small Computer System Interface data sequence and sending the  
6 sequence to the initiator over the network.

1 17. The article of claim 16 wherein the storage medium further comprises  
2 machine readable instructions stored thereon to store in said cache the target addresses  
3 within said target storage from which the target data stored in said cache was obtained.

1 18. The article of claim 16 wherein said target controller includes a state machine  
2 having Internet Small Computer System Interface session state variables, and said  
3 network adapter includes a state machine having at least one Internet Small Computer  
4 System Interface session state variable, and wherein the storage medium further  
5 comprises machine readable instructions stored thereon to synchronize a value of said  
6 network adapter state variable to a value of said target controller state variable in  
7 connection with said network adapter translating said target data to be sent to said  
8 initiator into an Internet Small Computer System Interface data sequence.

1 19. The article of claim 18 wherein the storage medium further comprises  
2 machine readable instructions stored thereon to:  
3 receive from said initiator, a second packet containing a second read command  
4 which addresses target data having a target address within said target storage;  
5 compare the target address of the second read command to a target address of the  
6 target data in the cache for the network adapter engine; and

7 process said read command using said target controller if the target data stored in  
8 the cache was obtained from target addresses which do not correspond to the read  
9 command target address, said processing including sending target data to the initiator.

1 20. The article of claim 19 wherein the storage medium further comprises  
2 machine readable instructions stored thereon to synchronize a value of said target  
3 controller state variable to a value of said network adapter state variable in connection  
4 with said target controller processing said second read command.

1 21. A system for use with a network and an initiator coupled to the network,  
2 comprising:

3 at least one memory which includes an operating system;  
4 a processor coupled to the memory;  
5 a bus;  
6 a target controller coupled to the bus;  
7 data storage adapted to store target data;  
8 a data storage controller for managing Input/Output (I/O) access to the  
9 data storage;  
10 a device driver executable by the processor in the memory; and  
11 a network controller coupled to the bus and having an offload engine and a  
12 cache adapted to store target data from at least one target address of said target  
13 data storage, said network controller being adapted to:  
14 receive from the initiator, a packet containing a read command  
15 which addresses target data having a target address within said target storage; and  
16 compare the target address of the read command to a target address  
17 of the target data in the cache for the network controller engine;  
18 wherein said offload engine is adapted to process said read  
19 command if target data stored in the cache was obtained from a target address which  
20 corresponds to the read command target address, said processing including sending target  
21 data stored in the cache through the network to the initiator.

1           22. The system of claim 21 wherein the network controller is further adapted to  
2 forward the read command over the bus to the target controller to be processed by the  
3 target controller if the target data stored in the cache was obtained from a target address  
4 which does not correspond to the read command target address.

1           23. The system of claim 21 wherein said read command is a Small Computer  
2 System Interface command and said packet includes an Internet Small Computer System  
3 Interface package packaging said Small Computer System Interface command.

1           24. The system of claim 23 wherein said packet includes an Ethernet packet,  
2 Internet Protocol and Transmission Control Protocol package layers encapsulated in the  
3 Ethernet packet, and wherein the Internet Small Computer System Interface package is  
4 encapsulated in the Internet Protocol and Transmission Control Protocol package layers.

1           25. The system of claim 24 wherein the network controller is further adapted to  
2 forward the read command over the bus to the target controller for processing by the  
3 target controller if the target data stored in the cache was obtained from a target address  
4 which does not correspond to the read command target address and wherein the target  
5 controller is adapted to process the read command in accordance with an Internet Small  
6 Computer System Interface layer.

1           26. The system of claim 25 wherein the offload engine of the network controller  
2 is adapted to process the read command in accordance with an Internet Small Computer  
3 System Interface layer including translating said target data to an Internet Small  
4 Computer System Interface data sequence and sending the sequence to the initiator over  
5 the network.

1           27. The system of claim 26 wherein the network controller cache is further  
2 adapted to store the target addresses within said target storage from which the target data  
3 stored in said cache was obtained.

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1           28. The system of claim 26 wherein said target controller includes a state  
2 machine having Internet Small Computer System Interface session state variables, and  
3 said network controller includes a state machine having at least one Internet Small  
4 Computer System Interface session state variable, and wherein the storage controller is  
5 further adapted to synchronize a value of said network controller state variable to a value  
6 of said target controller state variable in connection with offload engine translating said  
7 target data to be sent to said initiator into an Internet Small Computer System Interface  
8 data sequence.

1           29. The system of claim 28 wherein the network controller is further adapted to:  
2           receive from said initiator, a second packet containing a second read command  
3 which addresses target data having a target address within said target storage;  
4           compare the target address of the second read command to a target address of the  
5 target data in the cache for the network adapter engine; and  
6           forward said read command over said bus to said target controller if the target  
7 data stored in the cache was obtained from target addresses which do not correspond to  
8 the read command target address; and  
9           wherein the target controller is adapted to process said read command, translate  
10 target data from said storage to an Internet Small Computer System Interface data  
11 sequence and send the sequence to the initiator over the network.

1           30. The system of claim 29 wherein the target controller is further adapted to  
2 synchronize a value of said target controller state variables to a value of said network  
3 adapter state variable in connection with said target controller processing said second  
4 read command.

1           31. The system of claim 21 for use with an unshielded twisted pair cable, said  
2 system further comprising an Ethernet data transceiver coupled to said network controller  
3 and said cable and adapted to transmit and receive data over said cable.

1           32. The system of claim 21 further comprising a video controller coupled to said  
2 processor.

3           33. A device for use with a target controller, a bus, a data storage adapted to  
4 store target data, a network and an initiator coupled to the network, comprising:  
5               a network controller having an offload engine and a cache adapted to store  
6 target data from at least one target address of said target storage, said network  
7 controller being adapted to:  
8               receive from the initiator, a packet containing a read command  
9 which addresses target data having a target address within said target storage; and  
10              compare the target address of the read command to a target address  
11 of the target data in the cache for the network controller engine;  
12              wherein said offload engine is adapted to process said read  
13 command if target data stored in the cache was obtained from a target address which  
14 corresponds to the read command target address, said processing including sending target  
15 data stored in the cache through the network to the initiator.

1           34. The device of claim 33 wherein the network controller is further adapted to  
2 forward the read command over the bus to the target controller to be processed by the  
3 target controller if the target data stored in the cache was obtained from a target address  
4 which does not correspond to the read command target address.

1           35. The device of claim 33 wherein said read command is a Small Computer  
2 System Interface command and said packet includes an Internet Small Computer Device  
3 Interface package packaging said Small Computer System Interface command.

1           36. The device of claim 35 wherein said packet includes an Ethernet packet, and  
2 Internet Protocol and Transmission Control Protocol package layers encapsulated in the  
3 Ethernet packet, and wherein the Internet Small Computer System Interface package is  
4 encapsulated in the Internet Protocol and Transmission Control Protocol package layers.

1           37. The device of claim 36 wherein the network controller is further adapted to



2 forward the read command over the bus to the target controller for processing by the  
3 target controller if the target data stored in the cache was obtained from a target address  
4 which does not correspond to the read command target address and wherein the target  
5 controller is adapted to process the read command in accordance with an Internet Small  
6 Computer System Interface layer.

1 38. The device of claim 37 wherein the offload engine of the network controller  
2 is adapted to process the read command in accordance with an Internet Small Computer  
3 System Interface layer including translating said target data to an Internet Small  
4 Computer System Interface data sequence and sending the sequence to the initiator over  
5 the network.

1 39. The device of claim 38 wherein the network controller cache is further  
2 adapted to store the target addresses within said target storage from which the target data  
3 stored in said cache was obtained.

1 40. The device of claim 38 wherein said target controller includes a state machine  
2 having Internet Small Computer System Interface session state variables, and said  
3 network controller includes a state machine having at least one Internet Small Computer  
4 System Interface session state variable, and wherein the storage controller is further  
5 adapted to synchronize a value of said network controller state variable to a value of said  
6 target controller state variable in connection with offload engine translating said target  
7 data to be sent to said initiator into an Internet Small Computer System Interface data  
8 sequence.

1 41. The device of claim 40 wherein the network controller is further adapted to:  
2 receive from said initiator, a second packet containing a second read command  
3 which addresses target data having a target address within said target storage;  
4 compare the target address of the second read command to a target address of the  
5 target data in the cache for the network adapter engine; and

6 forward said read command over said bus to said target controller if the target  
7 data stored in the cache was obtained from target addresses which do not correspond to  
8 the read command target address; and  
9 wherein the target controller is adapted to process said read command, translate  
10 target data from said storage to an Internet Small Computer System Interface data  
11 sequence and send the sequence to the initiator over the network.

1 42. The device of claim 41 wherein the target controller is further adapted to  
2 synchronize a value of said target controller state variables to a value of said network  
3 adapter state variable in connection with said target controller processing said second  
4 read command.